BULLETIN 469 NOVEMBER, 1930

The Development of Market Milk Areas in Northeastern Ohio

C. G. McBride

OHIO
AGRICULTURAL EXPERIMENT STATION
Wooster, Ohio

The Ohio State University
3 6267 01222012 8

This page intentionally blank.

CONTENTS

This page intentionally blank.

THE DEVELOPMENT OF MARKET MILK AREAS IN NORTHEASTERN OHIO

C. G. McBride

Market milk is the largest single source of income on many farms of northeastern Ohio. The demand for whole milk for city consumption in large enough quantities to disturb materially the cheese and butter industries made its appearance about 1900. The shift from the manufacture of cheese and butter to market milk has been brought about by several economic influences. It is the purpose of this bulletin to trace some of these influences in milk marketing in thirty-three counties of northeastern Ohio.

Some striking economic changes have occurred in the area during this period. Transportation of milk has gone from railroad to trucks; cities have doubled and trebled their populations, greatly changing the ratios of dairy cows to people; the power of boards of health to control and supervise the production and marketing of milk has been enlarged; and milk producers' cooperative associations have come into the field to play an important part in determining marketing policies. The situation is never in a stationary condition.

TERRITORY INCLUDED IN THIS STUDY

The study deals with the following counties: Ashland, Ashtabula, Belmont, Carroll, Columbiana, Coshocton, Crawford, Cuyahoga, Erie, Geauga, Guernsey, Hancock, Harrison, Holmes, Huron, Jefferson, Knox, Lake, Lorain, Mahoning, Medina, Muskingum, Ottawa, Portage, Richland, Sandusky, Seneca, Stark, Summit, Trumbull, Tuscarawas, Wayne, and Wyandot. This area, Figure 1, includes approximately the combined milk sheds of Cleveland, Akron, Canton, Youngstown, Warren, Pittsburg as to Ohio, and the other smaller markets of eastern Ohio. In times of fall milk shortage Cleveland recently has found it necessary to go far beyond these limits for milk and cream.

The old Connecticut Western Reserve, more commonly called simply the Western Reserve, lay within this area. It was bounded on the south by the forty-first parallel, west one hundred and twenty miles from the Pennsylvania line, and thence north parallel with the Pennsylvania line to Lake Erie. It comprised all of what is now Erie, Huron, Lorain, Cuyahoga, Medina, Lake, Portage,

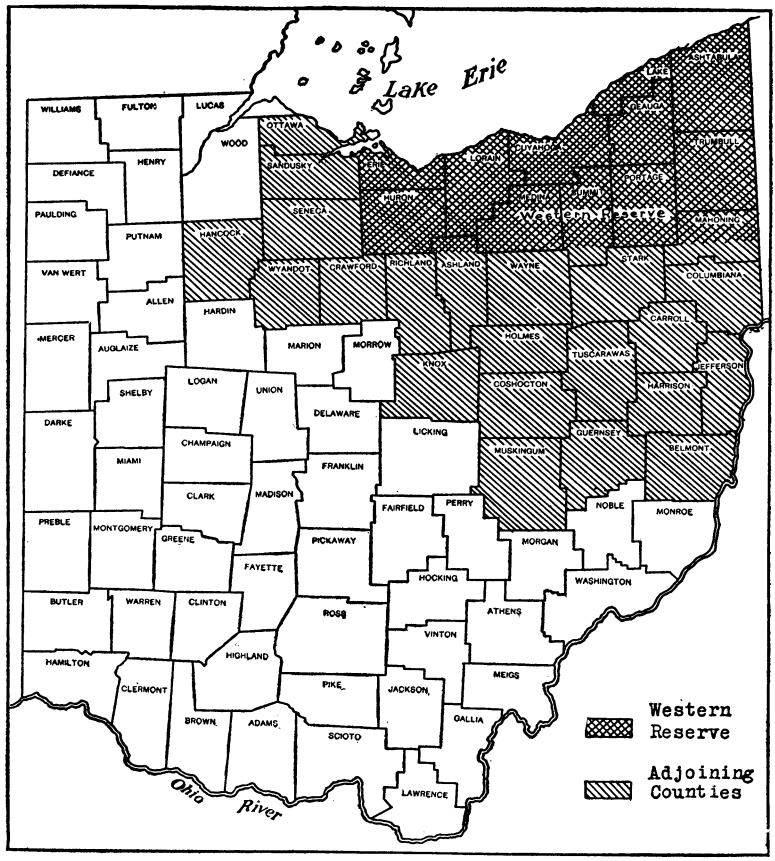

Fig. 1.—State of Ohio, showing counties included in the study

Ashtabula, and Trumbull, and almost all of Mahoning and Summit counties. The portions of the latter two counties falling south of the forty-first parallel are so small in acreage that the twelve counties entire will be designated throughout the study as the Western Reserve.

TYPE OF FARMING AND CHARACTER OF MILK PRODUCTION

U. S. CENSUS DATA

The type of farming that predominates in a locality determines in a large measure its attractiveness to city milk dealers as a source of milk supply. A somewhat general picture of the type of farming and the changes in the relative importance of various farm

enterprises can be gotten from the United States Census. These census figures from 1900 to 1925 reveal some striking changes within the thirty-three counties included in the study.

TABLE 1.—Changes in Number of Farms in Ohio and Selected Areas, 1900-1925

County	Number of farms			
	1900	1910	1920	1925
Western Reserve Counties:				
Ashtabula	5,038	4,926	4,810	4,588
Cuyahoga	4,571	4,493	3,375	2,715
Erie	1,970	1,956	1,883	1,828
Geauga	2,520	2,574	2,576	2,534
Huron	3,097	2,928	2,728	2,753
Lake	1,902	1,945	1,771	1,913
Lorain	3,660	3,586	3,425	3,355
Mahoning	3,034	3,024	2,555	2,588
Medina	2,978	3,159	3,018	3,069
Portage	3,557	3,591	3,406	3,192
Summit	2,871	2,959	2,529	2,304
Trumbull	4,345	4,456	3,911	3,928
Western Reserve	39,543	39,597	35,978	34,767
21 adjacent counties	65,840	65,089	61,621	60,231
33 N. E. Ohio counties	105,383	104,686	97,599	94,998
Total State	276,719	272,045	256,695	244,703

There was a marked decrease in number of farms in Ohio during this period, altho the thirty-three counties studied did not, as a whole, quite keep pace with the percentage decline of the State. In the Western Reserve the decline was 12.1 per cent as compared with 9.9 in the adjacent twenty-one counties and 11.6 in the entire State. A synopsis of these changes is given in Table 1. The figures by counties are given for the Western Reserve to show where the sharpest declines occurred. They were in the counties

TABLE 2.—Number of Dairy Cows in Ohio and Selected Areas, 1900-1925

County	Number of dairy cows			
	1900	1910	1920	1925
Western Reserve Counties:				
Ashtabula	23,461	25,422	24,321	25,436
Cuyahoga	15,485	12,633	10,386	6,393
Erie	5,366	5,427	5,940	6,318
Geauga	16,605	17,151	16,407	15,209
Huron	8,758	8,990	9,219	9,162
Lake	5,486	6,001	5,845	4,872
Lorain	15,847	17,506	18,443	18,169
Mahoning	12,394	13,849	13,821	13,753
Medina	11,266	12,786	15,238	13,787
Portage	15,807	16,791	18,099	17,138
Summit	15,330	14,673	12,997	10,624
Trumbull	21,236	22,413	21,707	19,765
Western Reserve	167,041	173,642	172,423	160,626
21 adjoining counties	210,293	229,421	216,751	210,472
33 N. E. Ohio counties	337,334	403,063	389,174	371,098
Total State	818,239	905,125	888,057	839,880

most affected by the growth of Cleveland and Akron. Cuyahoga County dropped off 40.6 per cent and Summit County 19.8 per cent in number of farms.

More significant than number of farms is the number of dairy cows. Table 2 gives the changes in this factor with the same arrangement of detail as in Table 1 because it was here that the changes by counties were most significant.

TABLE 3.—Number of Dairy Cows and Milk Production of Northeastern Ohio Counties Expressed as Percentages of the Totals for Ohio, 1900-1925*

County	Number of dairy cows				Milk production			
	1900	1910	1920	1925	1899	1909	1919	1924
	%	%	%	%	%	%	%	%
Ashtabula	2.87	2.81	2.74	3.03	2.55	3.32	3.18	3.31
Cuyahoga	1.89	1.40	1.17	.76	2.17	2.05	1.34	.78
Erie	.66	.60	.67	.75	.63	.69	.67	.71
Geauga	2.03	1.89	1.85	1.81	1.83	2.40	2.56	2.50
Huron	1.07	.99	1.04	1.09	1.06	1.19	.90	1.18
Lake	.67	.66	.66	.58	.72	.78	.75	.63
Lorain	1.94	1.93	2.08	2.16	2.01	2.52	2.78	2.75
Mahoning	1.51	1.53	1.56	1.64	1.58	1.61	1.66	1.71
Medina	1.38	1.41	1.72	1.64	1.47	1.30	1.99	1.95
Portage	1.93	1.86	2.04	2.04	1.93	1.76	2.29	2.25
Summit	1.87	1.62	1.46	1.26	1.96	1.92	1.77	1.49
Trumbull	2.60	2.48	2.44	2.35	2.65	2.79	2.91	2.50
W. Reserve	20.41	19.18	19.43	19.12	20.56	22.33	22.82	21.76
Ashland	.98	.99	.94	1.03	1.05	1.09	.87	.95
Belmont	1.44	1.48	1.54	1.75	1.52	1.45	1.48	1.58
Carroll	.93	.84	.81	.75	.94	.72	.88	.70
Columbiana	1.94	1.92	1.79	1.68	1.99	1.62	1.78	1.76
Coshocton	1.08	.98	.89	.74	1.04	.96	1.01	.90
Crawford	1.02	1.01	.98	.89	1.07	.96	.88	.94
Guernsey	1.04	.94	.75	.54	1.04	.88	.87	1.08
Hancock	1.27	1.34	1.11	1.35	1.22	1.14	1.11	1.32
Harrison	.83	.74	.61	.64	.78	.81	.66	.50
Holmes	1.09	1.24	1.24	1.28	1.04	1.29	.95	1.27
Jefferson	.94	.86	.75	.82	1.00	.66	.73	.76
Knox	1.06	1.08	.92	1.27	1.17	.98	1.04	1.12
Muskingum	1.37	1.27	1.14	.98	1.25	1.28	1.16	1.19
Ottawa	.72	.69	.67	.74	.54	.68	.48	.57
Richland	1.25	1.32	1.34	1.20	1.22	1.22	1.16	1.15
Sandusky	1.04	1.04	1.00	1.21	.99	1.07	1.01	1.00
Seneca	1.45	1.38	1.33	1.32	1.34	1.26	.93	1.13
Stark	2.10	2.16	2.24	2.38	2.11	2.07	2.47	2.66
Tuscarawas	1.62	1.51	1.49	1.36	1.47	1.61	1.45	1.42
Wayne	1.68	1.78	2.07	2.35	1.68	1.71	2.06	2.53
Wyandot	.83	.78	.81	.78	.80	.76	.73	.77
21 counties	25.70	25.35	24.42	25.06	25.28	24.22	23.42	25.30
33 N. E. Ohio counties	46.11	44.53	43.85	44.18	45.84	46.55	46.24	47.06

*Milk production for the previous year.

Seven of the twelve counties in the Western Reserve showed increases in dairy cows in 1925 as compared with 1900, but the sharp declines in the five counties—Cuyahoga, Geauga, Lake, Summit, and Trumbull—were enough to account for a decline of 6,415 dairy cows in the Reserve as a whole.

Numbers of dairy cows and milk production by counties are expressed as percentages of the state total in Table 3. With some decline in farms and dairy cows milk production more than maintained its relative position in the area.

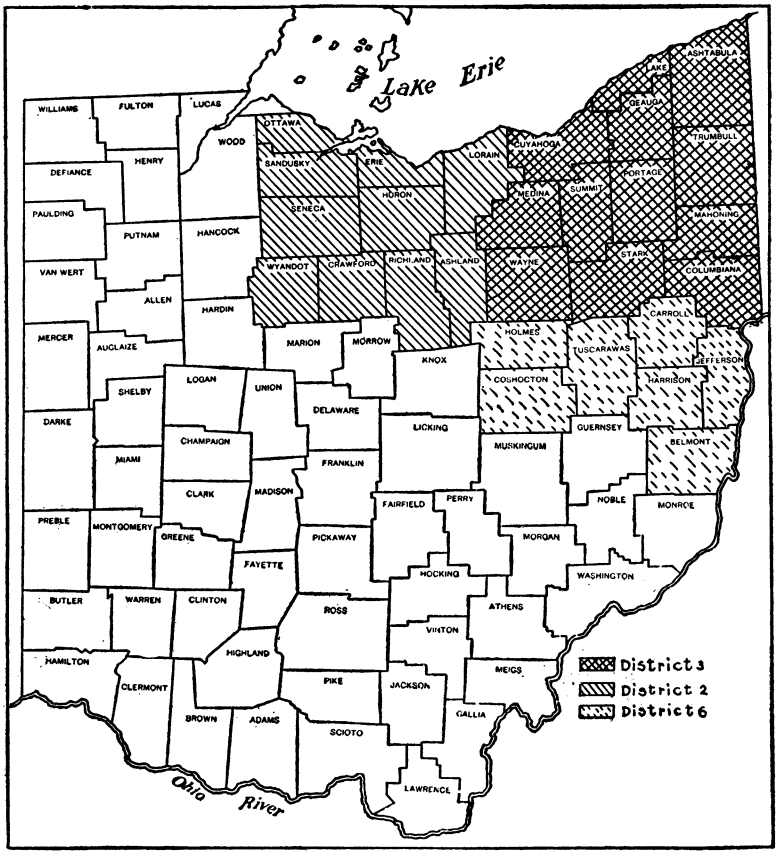

Fig. 2.—Crop reporting districts of Northeastern Ohio

In 1899 the Western Reserve produced 20.56 per cent of the milk produced in the State with 20.41 per cent of the cows; in 1924 it produced 21.76 per cent of the milk with 19.12 per cent of the cows. There was practically no change in relative production in the 21 adjacent counties. The production by the Western Reserve of an increasing percentage of the total milk output with relatively fewer cows indicates greater improvement in dairy practice in these counties than in the State as a whole.

CROP AND LIVESTOCK REPORTS ON MILK PRODUCTION[1]

The Federal and State crop and livestock reports provide a means of measuring some of the factors entering into the shaping of market-milk areas. Ohio Districts 3, 2, and 6 comprise all of the thirty-three counties of the study with the exception of Guernsey, Muskingum, Knox, and Hancock. Fortunately these districts divide the area into three groups of counties with certain peculiar characteristics. This division is shown in Figure 2.

District 3 comprises that part of the Western Reserve that had the earliest and most intensive development as a dairy section and also the three additional intensive dairy counties—Stark, Columbiana, and Wayne.

District 2 comprises the three western counties of the Reserve and seven additional ones south and west which make up an area that has recently been undergoing considerable development by Cleveland milk dealers.

District 6 comprises that block of counties on the border of both the Cleveland and Pittsburg milk sheds. In the western part of this block is to be found what is left of the cheese industry in Ohio.

TABLE 4.—Estimated Annual Production of Milk per Cow on Farms of Crop Reporters

District	Milk per cow				
	1926	1927	1928	1929	4-Yr. Av.
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
3	6304	6392	6495	6351	6385
2	5873	6049	6092	6159	6043
6	5293	5452	5660	5882	5572
State	5706	5834	5816	5891	5812

Production per cow is a factor of considerable interest to the purchaser of market milk. The data on this point compiled by the crop and livestock reporting service are more valuable than those of the United States Census. Table 4 gives the production of milk per cow per year as estimated from the reports on all milk cows in the herds of crop reporters on the first day of the month for 1926-1929. The figures of Table 4 are somewhat higher than census figures which take in all farms, but are probably much nearer to those of farms selling whole milk than the census estimate. This table shows that the twelve counties of District No. 3 have a

[1]The data for these analyses were secured from G. S. Ray, Agricultural Statistician of the United States Department of Agriculture, Federal Building, Columbus, Ohio.

materially higher production in pounds of milk per cow than either of the other districts. The Holstein is the dominating breed in this district.

TABLE 5.—Pounds of Milk per Day per Farm on First Day of Month. Crop Reporters' Farms, District No. 3, 1925-1929

Day	Production of milk per day per farm					
	1925	1926	1927	1928	1929	5-year average
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
January 1	160.5	170.8	131.4	148.4	140.3	150.3
February 1	179.8	133.4	129.5	168.0	143.6	150.9
March 1	171.5	139.9	134.4	166.8	149.6	163.2
April 1	148.2	200.4	154.0	195.3	161.2	171.8
May 1	166.0	204.6	171.1	194.4	173.3	181.9
June 1	193.0	182.3	175.9	211.7	195.8	181.8
July 1	162.5	187.1	206.7	192.5	170.7	183.9
August 1	161.1	166.3	166.0	195.3	165.1	170.8
September 1	151.3	156.6	156.6	180.9	141.3	157.3
October 1	133.8	159.7	117.2	140.4	134.4	137.1
November 1	127.9	130.8	116.4	124.1	135.8	127.0
December 1	132.9	123.6	128.1	127.7	144.2	131.3

The seasonal variation of production is a very important matter in market milk. District 3 is most typical as a market-milk producing area. The month to month variation in production as reported by crop reporters for the first day of the month is given in Table 5. These figures are not to be regarded as averages for the calendar months. In the season when production is on the increase they are lower than an average for the month and when it is on the decline they are higher. On the basis of average monthly production, April, May, and June are consistently the highest months in this area, but July 1 is higher than April 1 in three years of the five in Table 5.

TABLE 6.—Percentage Variation of Pounds of Milk Produced per Farm on the First Day of Month. Crop Reporters' Farms, District No. 3, 1925-1929

Day	1925	1926	1927	1928	1929	5-year average
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
January 1	102.0	102.0	88.2	87.1	90.7	94.6
February 1	114.2	79.7	87.0	98.6	92.9	94.9
March 1	109.0	115.8	90.2	97.8	96.8	102.7
April 1	94.2	119.7	103.4	114.6	104.3	108.1
May 1	105.5	122.2	114.9	114.1	112.1	114.4
June 1	122.6	108.9	118.1	124.2	126.6	114.4
July 1	103.2	111.7	138.8	112.9	110.4	115.7
August 1	102.4	99.3	111.4	114.6	106.8	107.5
September 1	96.1	93.5	105.1	106.1	91.4	99.0
October 1	85.0	95.4	78.7	92.4	86.9	86.3
November 1	81.3	78.1	78.2	72.8	87.8	79.9
December 1	84.4	73.8	86.0	74.9	93.3	82.6

In Table 6 the first day of the month production over the five years is expressed in relatives or per cent of average. They are computed as follows: the monthly figures for the year are added and their sum is divided by twelve. This average is then used as a base and each month is expressed as a percentage of this average.

FARM COST ACCOUNTS

A group of more intensive dairy farms was selected from these cooperating with the Department of Rural Economics of the Ohio Agricultural Experiment Station. Ten farms were chosen from a cost account route of twenty-three cooperators in Medina County[2]. The year 1924 was selected as typical.

The average size of the ten farms was 134.4 acres. In 1924 an average of 72.5 acres was in hay and pasture. About 50 per cent of the gross receipts from sales of farm products were from milk. There was an average of 12.5 cows per farm.

TABLE 7.—Milk Production by Months of Ten Cost-Account Farms, Medina County, 1924

Month	Total production	Average production per day per farm	Per cent of monthly average
	Pounds	*Pounds*	
January	82,301	265.5	97.6
February	82,984	286.1	105.2
March	94,309	304.2	111.8
April	96,040	320.1	117.7
May	104,733	337.8	124.2
June	96,882	322.9	118.7
July	88,694	286.1	105.2
August	78,130	252.0	92.6
September	70,944	236.5	86.9
October	70,201	226.5	83.3
November	65,640	218.8	80.4
December	64,440	207.8	76.4
Total	995,298	.....	.....
Average	.....	272.02	.....

In Table 7 is shown the total milk production, the average production per day per farm each month, and the seasonal distribution of this production in per cent of the monthly average. These farms show production for the year almost twice as great as that of crop reporters in the same district, but their seasonal distribution is about the same as that for the larger group.

[2]For a more detailed description of this group of farms see Bulletin 424, Ohio Agricultural Experiment Station, Dairy and Other Livestock Production Costs in Medina County, F. L. Morison, July 1928.

POPULATION GROWTH AND INCREASING MILK DEMANDS 1870-1920

The growth of population is the determining factor in most instances in the development of market-milk areas and changing of milk-shed lines. Northeastern Ohio located in the famous "Iron Triangle" with points in Pittsburg, Cleveland, and Buffalo has had in the past twenty-five years a rapid increase in urban population.

TABLE 8.—Number of Dairy Cows Compared With Total and Urban Population in Northeastern Ohio, 1870-1920

Compiled from United States Census

Year	No. of dairy cows* Thousands	Total population Thousands	Urban† population Thousands	Cows per 100 population	
				Total	Urban
12 Western Reserve counties					
1870	171	431	142	39.7	120.7
1880	174	545	245	31.9	70.9
1890	161	695	409	23.1	39.3
1900	167	891	606	18.7	27.6
1910	174	1214	923	14.3	18.8
1920	172	1834	1528	9.4	11.3
21 adjacent counties					
1870	165	591	91	27.9	180.6
1880	200	694	161	28.9	124.5
1890	207	769	253	26.9	81.9
1900	210	822	299	25.6	70.4
1910	229	913	393	25.1	58.3
1920	217	1027	501	21.2	43.3
Total area—33 counties					
1870	336	1021	233	32.9	144.2
1880	374	1239	406	30.2	92.2
1890	368	1464	662	25.1	55.6
1900	377	1713	809	22.0	41.7
1910	403	2128	1316	18.9	30.6
1920	389	2861	2029	13.6	19.2

*Milch cows, 1870, 1880, 1890. Dairy cows 2 years old and over, 1900, 1910, 1920.
†Persons living in towns of 2500 population and over.

The extent of the growth of market-milk areas depends very largely upon the changing ratios of human to cow population. This is shown for the period of 1870 to 1920 for the thirty-three counties in the usual grouping in Table 8. They are plotted in Figures 3 and 4 in a manner to show more strikingly the relative rates of increase.

Both the number of dairy cows and the population of open country and towns under 2500 remained almost constant. The problem, therefore, resolved principally into adjustment of a fairly constant milk supply to the needs of a very rapidly growing urban population. There was some increase in the supply through higher production of milk per cow but this was small compared with the increase in total demand. The slight increase in production per

cow was probably equalled by the increase in per capita consumption of milk.

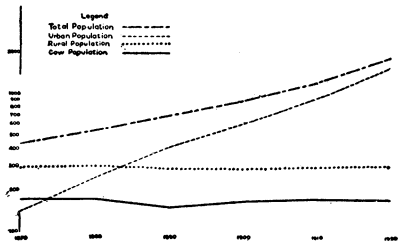

Fig. 3.—Population and dairy cows, 12 counties Western Reserve, 1870-1920

In 1870 when there were fewer people living in towns of 2500 and over than there were dairy cows in the area, only a small proportion of the milk production was needed for fluid consumption. At this time the area, and particularly the Western Reserve, was heavily engaged in cheese and butter manufacture.

Pittsburg and the other industrial towns of western Pennsylvania found their supplies of milk, in the main, within Pennsylvania until around 1900. About this time they began to look to northeastern Ohio for a considerable portion of their milk requirements. After 1900 it therefore became necessary to include a block of seven counties of western Pennsylvania in the calculations. This larger area of forty counties is given for the period of 1900 to 1920 in Table 9. The trends starting with 1870 are given in Figure 5.

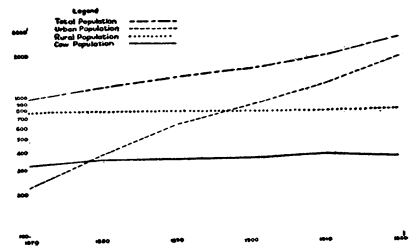

Fig. 4.—Population and dairy cows, 33 counties—N. E. Ohio, 1870-1920

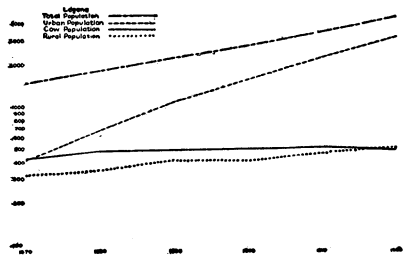

Fig. 5.—Population and dairy cows, 40 counties N. E. Ohio & W. Pennsylvania, 1870-1920

The seven Pennsylvania counties, Allegheny, Beaver, Butler, Crawford, Lawrence, Mercer, and Washington, with Pittsburg as the center of population, were similar in many respects to the counties of the Western Reserve in Ohio. Both areas were experiencing a rapid decline in the ratio of cows to urban population. In the Pennsylvania counties the actual decline in number of dairy cows began during the period of 1900 to 1910 with a decrease of 5000 for the

decade. The twelve counties of the Western Reserve gained 7000 in dairy-cow population over the same period but experienced a marked decline in ratio. In the next decade the Pennsylvania counties lost 7000 while the Ohio counties declined but 2000 in dairy cows.

TABLE 9.—Number of Dairy Cows Compared With Total and Urban Population in 40 Counties of Northeastern Ohio and Western Pennsylvania, 1900-1920

Compiled from United States Census

Year	Dairy cows	Total population	Urban population	Dairy cows per 100 population	
				Total	Urban
12 Western Reserve counties, Ohio	*Thous.*	*Thous.*	*Thous.*		
1900	167	891	606	18.7	27.6
1910	174	1214	923	14.3	18.8
1920	172	1834	1528	9.4	11.3
33 counties, N. E. Ohio					
1900	377	1713	905	22.0	41.7
1910	403	2128	1316	18.9	30.6
1920	389	2861	2029	13.6	19.2
7 counties,* Western Pa.					
1900	136	1159	736	11.7	18.4
1910	131	1522	1042	8.6	12.5
1920	124	1804	1283	6.9	9.6
40 counties, Western Pa. and N. E. Ohio					
1900	513	2872	1641	17.9	31.1
1910	534	3650	2357	14.6	22.6
1920	513	4665	3312	11.0	15.5

*Allegheny, Beaver, Butler, Crawford, Lawrence, Mercer, and Washington—Pennsylvania.

The amount of milk that must be added to the supply of a market is determined by the rate of population growth and by changes in per capita consumption. Milk consumption was on the increase during this period but exact figures on rate of per capita increase are not available.

The United States Census provides more accurate records upon population and dairy cows. In 1900 the seven Pennsylvania counties had an urban population of 735,730 and the twelve Ohio counties 316,654. In terms of additional milk requirements, therefore, the two areas ran about parallel, but the decline in cows in the Pennsylvania counties made it necessary for Pittsburg dealers to exert greater effort to enlarge supplies from areas more distant from the market. It was during this decade that Pittsburg buyers went into Ashtabula and Trumbull counties and began to develop them as a part of the milk shed.

In the following decade, 1910 to 1920, there was a marked change in the rate of population increase in the two areas. The growth of urban population in the Ohio area was much more rapid

than in the Pittsburg district. The seven Pennsylvania counties gained but 241,838 while the twelve Ohio counties increased 605,624, or two and one-half times as much.

The large difference in gains of the two areas is largely accounted for in the rapid growth of Akron and Cleveland. Akron grew from a population of 69,067 in 1910 to 208,435 in 1920. Cleveland went from 560,663 in 1910 to 796,840, a gain of 236,178. Pittsburg had 533,905 population in 1910 and 594,277 in 1920, a gain of but 60,372. The increase in Cleveland alone was almost equal to that of the entire seven counties of western Pennsylvania.

FARM SALES AS SHOWN IN MILK PLANT RECORDS

From the market point of view the best measure of the amount and seasonal distribution of the milk supply of an area is to be found in the records of sales at the milk plants. These records were studied at several marketing points throughout the 33 counties. In the Akron and Canton markets the records of milk receipts by all dealers were secured from the producers' association offices.

TABLE 10.—Monthly Receipts of Milk, Number of Producers Delivering, and Average Daily Sales per Farm of 15 Pittsburg Country Plants for 1927

Month	Plant receipts	Producers delivering	Average sales, daily	Per cent of average
	Pounds	*No.*	*Pounds*	
January	7,496,210	1,762	137.2	93.5
February	7,171,577	1,760	145.5	99.1
March	8,602,149	1,773	156.5	106.6
April	9,310,628	1,798	172.6	117.6
May	11,817,904	1,840	207.2	141.1
June	11,627,370	1,880	206.1	140.4
July	9,539,391	1,879	163.8	111.6
August	7,308,425	1,867	126.3	86.0
September	6,007,509	1,859	107.8	73.4
October	5,841,109	1,818	103.6	70.6
November	5,942,912	1,793	110.5	75.3
December	6,896,409	1,779	125.0	85.1
Total	97,561,593	.....	.....	.....
Average	.....	1,817	146.8	.....

The records for 1927 of four important sources were chosen as representatives. These sources were: fifteen country plants sending milk into Pittsburg, all the country plants of the largest distributor in the Cleveland market, dealers buying from the Milk Producers' Association of Summit County and Vicinity serving the

Akron market, and those purchasing from Stark County Milk Producers' Association supplying the Canton market. These combined samples represent slightly over six thousand producers.

TABLE 11.—Monthly Receipts of Milk, Number of Producers Delivering, and Average Daily Sales per Farm of Group of Cleveland Country Plants, 1927

Month	Plant receipts	Producers delivering	Average sales, daily	Per cent of monthly average
	Pounds	*No.*	*Pounds*	
January	5,656,485	1,162	157.0	99.7
February	5,412,254	1,152	167.7	106.6
March	6,132,964	1,175	168.3	106.9
April	6,309,094	1,224	171.8	109.2
May	7,442,229	1,246	192.6	122.4
June	7,120,305	1,261	188.2	119.6
July	6,374,875	1,263	162.8	103.5
August	5,587,057	1,289	139.8	88.8
September	5,626,677	1,388	135.1	85.9
October	5,695,797	1,376	133.5	84.9
November	5,601,500	1,387	134.6	85.5
December	5,845,678	1,377	136.9	87.0
Total	72,804,915	.....	.....	.....
Average	.....	1,275	157.3	.....

The receipts of milk at these points and its seasonal distribution for 1927 are shown in Tables 10 to 13. The average daily sales per farm by months are shown graphically in Figure 6. The yearly average daily sales per farm did not vary greatly in the four

TABLE 12.—Monthly Sales of Milk, Number of Members Delivering, and Average Daily Sales per Farm of Milk Producers' Association of Summit County and Vicinity, 1927

Month	Sales to dealers	Members delivering*	Average daily sales	Per cent of average
	Pounds	*No.*	*Pounds*	
January	8,877,791	2,163	132.4	90.3
February	8,839,712	2,175	137.9	94.1
March	9,980,038	2,187	147.2	100.4
April	10,403,709	2,199	157.7	107.6
May	12,747,957	2,211	186.0	126.9
June	12,792,886	2,223	191.8	130.9
July	11,091,527	2,233	160.2	109.3
August	9,750,951	2,247	139.9	95.5
September	8,876,392	2,265	130.6	89.1
October	8,993,251	2,281	127.2	86.8
November	8,474,223	2,297	123.0	83.9
December	8,951,039	2,313	124.8	85.2
Total	119,779,476	.....	.....	.....
Average	.....	2,233	146.6	.....

*Actual count of members delivering January and July; others estimated.

TABLE 13.—Monthly Sales of Milk, Number of Members Delivering, and Average Daily Sales per Farm of Stark County Milk Producers, 1927

Month	Sales to dealers	Members delivering	Average daily sales	Per cent of average
	Pounds	*No.*	*Pounds*	
January	2,639,428	642	132.6	87.8
February	2,605,416	643	144.7	95.8
March	3,086,576	658	151.3	100.2
April	3,288,006	665	164.8	109.1
May	3,972,065	679	188.7	125.0
June	4,124,446	684	201.0	133.1
July	3,582,382	687	168.2	111.4
August	3,185,442	688	149.3	98.9
September	2,857,370	698	136.4	90.3
October	2,702,046	694	125.6	83.2
November	2,482,138	696	118.9	78.7
December	2,808,466	695	130.3	86.3
Total	37,333,781	.....	.....	.....
Average	.....	677	151.0	.....

markets. They were: Pittsburg country plants 146.8 pounds, Cleveland country plants 157.3 pounds, Akron dealers 146.6 pounds, and Canton dealers 151 pounds. The Akron and Canton producers run almost parallel in seasonal variation but there is a striking contrast in the case of the Pittsburg plants. These plants had average daily receipts per farm of 207.2 pounds in May and 103.6 pounds in

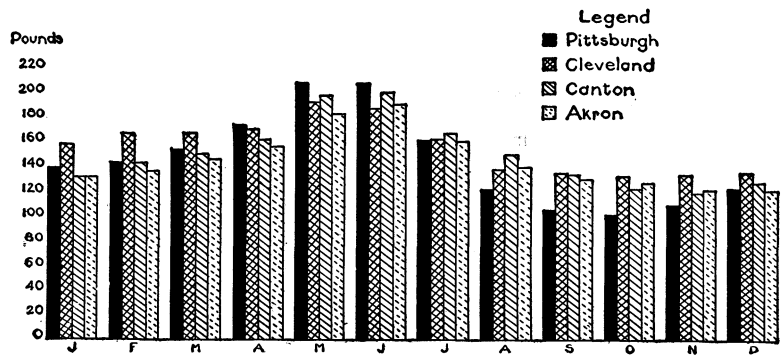

Fig. 6.—Daily sales per farm, 1927

October. The Summit Association with the same yearly average had its high point in June with 186 pounds per day average and the low in November at 122 pounds. The Stark County Producers had a slightly wider range than Summit County with 201 pounds in June and 120 pounds in November. The Cleveland producers were relatively high in January, February, and March but ran close to Akron and Canton the remainder of the year.

The per cent of monthly average is computed by adding the column of average daily sales, dividing the sum by 12, and using this as a base from which to derive the monthly percentages. From these columns it is possible to compare the seasonal variations of the four markets. These variations are presented in graphic form in Figure 7.

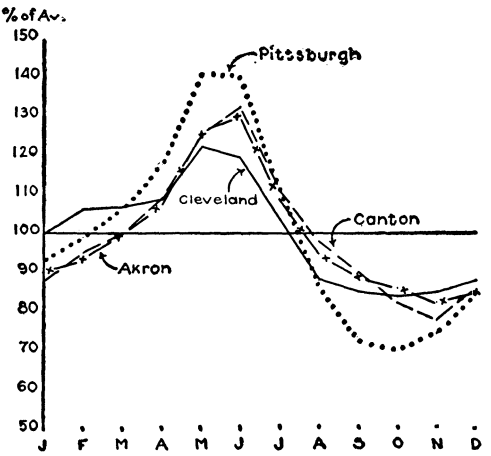

Fig. 7.—Seasonal variation, average daily sales, 4 markets, 1927

The amount of milk that is available for a market in the months of low production determines the adequacy of a city milk supply. Because of this fact, it is important to know the relation of average daily sales in the fall to the total for the year. These were computed for the four markets for 1927. They varied from .21 to .24 per cent as shown in Table 14. When all four markets were weighted together the percentage was .22. This means that if a producer who sold 100,000 pounds of milk in a year were typical in seasonal variation that he would be selling an average of 220 pounds per day in November.

TABLE 14.—November Daily Sales Expressed in Percentage of Annual Farm Sales, Pittsburg, Cleveland, Akron, and Canton Markets, 1927

Market	No. producers	Av. farm sales for year	Av. daily sales, November	November daily sales in per cent of annual sales
		Pounds	*Pounds*	
Pittsburg	1,817	53,694	110.5	.21
Cleveland	1,275	57,102	134.6	.24
Akron	2,233	53,641	123.0	.23
Canton	677	55,146	118.9	.22
Average, four markets	.....	54,562	121.5	.22

The year 1927 selected to illustrate the seasonal variation had a total production somewhat higher than average. Therefore, the fall production of these markets in the years 1925 to 1928 was analyzed. The range of average daily sales per farm in the months

of low production was 95 to 135 pounds. The midpoint, 115 pounds, is considered a more accurate norm of fall production than 121.5 pounds, as shown for November 1927 in Table 14.

COMPARISON OF CHEESE FACTORY AND MILK PLANT SALES

In the counties comprising the southeastern part of the area it is necessary to separate the Swiss cheese territory from the remainder to secure an accurate appraisal from the market-milk standpoint. The Dies-Fertig cheese factories as they were operated in 1927 provided a representative sample of the cheese area. Table 15 shows the monthly distribution of patrons and receipts of milk in the five communities in which this company was operating. In the six months, May to October inclusive, the number of patrons remained practically constant at 91. In January, February, and March only slightly over one-fourth of that number delivered.

TABLE 15.—Milk Receipts by Months, Dies-Fertig Cheese Factories, 1927

Month	Plant receipts	Farms delivering	Av. daily sales of farms delivering	Av. daily sales based on 91 farms
	Pounds	*Number*	*Pounds*	*Pounds*
January	118,889	24	160	42
February	111,003	23	173	44
March	160,708	25	207	57
April	403,267	78	172	148
May	803,509	91	285	285
June	911,753	91	334	334
July	825,533	90	296	293
August	809,325	91	287	287
September	691,605	92	251	253
October	578,183	91	205	205
November	375,323	87	144	137
December	212,497	61	112	75
Total	6,001,595	.....	.....	.....
Average	.....	70	219	180

Average daily sales per farm by months are computed on two bases in Table 15. In one case the receipts are determined on the basis of patrons actually delivering each month; in the others on the basis of 91, the number delivering in the summer. From the standpoint of the city milk market the latter method would appear to be the correct way to estimate market-milk possibilities. There were 91 milk producers involved and the amounts of milk received in the cheese factories for the year represent the total sales of the group for the year. Those who were off the active list before May and after October were selling no milk during those months.

In quantity of production these farms rank well with those of the counties of the Western Reserve. The average sales per day of the Dies-Fertig patrons for May to October, inclusive, 1927, were

TABLE 16.—Plant Receipts of Milk, Tuscarawas County Under Cheese Factory and Market-Milk Operation

Receipts of 5 Swiss cheese factories		Receipts at milk station, same area		1929-30 in per cent of 1927-28
Month	Pounds milk	Month	Pounds milk	
June 1927	911,753	June 1929	1,407,806	154.4
July 1927	825,533	July 1929	1,287,088	155.9
Aug. 1927	809,325	Aug. 1929	1,269,466	156.9
Sept. 1927	691,605	Sept. 1929	1,042,701	150.8
Oct. 1927	578,183	Oct. 1929	1,001,085	173.1
Nov. 1927	375,323	Nov. 1929	823,592	219.4
Dec. 1927	212,497	Dec. 1929	746,636	351.4
Jan. 1928	152,206	Jan. 1930	766,669	503.7
Feb. 1928	153,319	Feb. 1930	744,977	485.9
Mar. 1928	357,018	Mar. 1930	1,077,691	301.9
Average	5,066,762	Average	10,167,711	

276 pounds. The average sales of the entire 91 for the year were 181 pounds. Other factories from which records have been secured have averaged from 250 to 275 pounds per day during the summer months.

This area has been invaded by the milk companies of Cleveland and Akron. The experiences of the Telling-Belle-Vernon Company in taking over the Dies-Fertig plants indicate that market-milk outlets will attract more farmers and larger quantities of milk than cheese factories when an attractive price is offered for market milk.

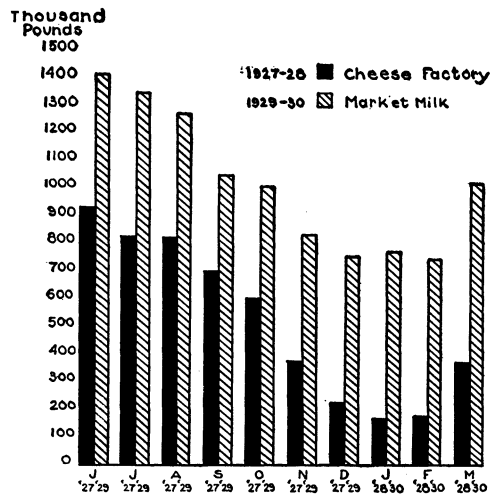

Fig. 8.—Receipts of milk under cheese factory and market-milk operation

In Table 16 and Figure 8 are shown actual receipts of milk for a ten-month period during cheese factory operation in comparison with the same period two years later under market milk. The total receipts for the period

in market milk were more than double those of the cheese factories. The greatest percentage of increase was in January and February of 1930.

TABLE 17.—Comparison of Sales per Day per Farm Under Cheese Factory and Market-Milk Operation for Area in Tuscarawas County, 1927-28 and 1929-30

Five Swiss cheese factories			Milk station on same area			1929-30 in per cent of 1927-28
Month	Farms selling	Av. sales per day	Month	Farms selling	Av. sales per day	
	No.	*Pounds*		*No.*	*Pounds*	
June 1927	91	334	June 1929	155	303	90.7
July 1927	90	296	July 1929	156	266	89.9
Aug. 1927	91	287	Aug. 1929	159	258	89.9
Sept. 1927	92	251	Sept. 1929	163	213	84.9
Oct. 1927	91	205	Oct. 1929	167	193	94.1
Nov. 1927	87	144	Nov. 1929	188	146	101.4
Dec. 1927	61	112	Dec. 1929	178	135	120.5
Jan. 1928	36	136	Jan. 1930	174	142	104.4
Feb. 1928	36	147	Feb. 1930	169	157	106.8
Mar. 1928	67	172	Mar. 1930	184	189	109.9
Weighted av. for 10-month period	.....	224	Weighted av. for 10-month period	.....	198	.....

Table 17 is a comparison of daily sales per farm under the two types of operation. The number of farmers selling increased steadily under market-milk operation. While the actual volume of receipts doubled as shown in Table 16, the weighted average daily sales were 26 pounds lower for the market-milk producers. When compared on the month to month basis, however, the fall sales, when milk is most needed, averaged higher under market milk operation than under cheese manufacture. This indicates that the additions made to the farms selling were somewhat lower in production but more regular than the original cheese factory patrons.

PER CAPITA CONSUMPTION OF MILK AND CREAM

Average daily per capita consumption in November was calculated by dividing the estimated population of Akron and Canton into the number of pounds of milk actually purchased by dealers for fluid distribution. Over the period 1925 to 1929 the per capita consumption of fresh milk and cream in milk equivalent fluctuated around three-fourths pound per day. This amount of milk would just enable the trade to meet the demand for fresh milk and cream. It would not leave any surplus supplies for ice cream and other uses during the period of lowest receipts.

The Division of Dairy and Poultry Products of the United States Bureau of Agricultural Economics estimated the per capita consumption of milk and cream in terms of milk equivalent in 1928

for Akron at 1.292 pounds and for Canton, 1.094 pounds per capita. This is an estimate based on figures furnished by the local boards of health for all-year-round operation and may be more accurately designated as the per capita disappearance of whole milk. It includes some fluid milk that goes into ice cream and some butter made from returns from retail routes.

SOURCES OF SUPPLY AND METHODS OF HANDLING IN TYPICAL MARKETS OF THE AREA

The source of the milk supply and the method of handling it in a given market depend, in a large measure, upon the size of the town and the character of farming territory surrounding it. Four towns and cities of different sizes and surroundings were chosen as typical and studied over a period of years. They are: East Palestine in Columbiana County, 3000 population; Warren, Trumbull County, 36,000 population; Canton, Stark County, 110,000 population; and Cleveland, 1,000,000 population.

East Palestine.—East Palestine is one of a large number of towns in northeastern Ohio of less than 10,000 population. It is not situated near enough to any large city to have its milk supply seriously affected by a larger market. It has been changing but little in population in the past five years.

In Columbiana County dairying is moderately intensive. The farms are small, averaging 74.3 acres. More than one-third of all farms fall in the size range of 50 to 99 acres. The census shows only 52 per cent of all milk production sold as whole milk in 1924.

The Board of Health of East Palestine had, in July 1926, seventeen farms under inspection for its milk supply. Retail milk routes were operated from fourteen of these farms, and the milk from the remaining three was sold to those who ran retail routes. The volume of sales of these routes ranged between 10 and 32 gallons with an average of 22 gallons per route.

The delivery equipment in all cases consisted of a touring car or a small truck. Each farm had a small milk house or milk room supplied in most instances with running water. About half had mechanical aerators. None of the milk was pasteurized. The total investment for equipment used exclusively for the handling of market milk in most instances did not exceed $50. This did not include the truck or car which was in no instance used exclusively for hauling milk.

The time required to cover the retail routes by these 14 producers did not average a full half day. This left the farmer free to devote the remainder of the day to his general farm operations.

The retail price of milk in East Palestine was 14 cents a quart and 7 cents a pint. The price prevailing for the milk purchased from farms under inspection was 25 cents per gallon. These prices gave the farmer-retailer a spread of 31 cents per gallon on the milk he purchased and it would probably be fair to assume that it would apply as well to his own production, for his next best outlet would be to sell at wholesale at approximately 25 cents a gallon. On the basis of an average daily delivery of 22 gallons these men were receiving $6.82 for the half day of time and use of equipment.

There was little disposition on the part of these men to cut prices. The retail price was steady and higher than many larger markets in the State. If one of these small retailers were to increase his business to 75 or 100 gallons per day it would be almost certain to disarrange his farm organization and probably result in lower labor efficiency.

In order to check upon the stability of a market of this type data were again collected in 1928 and 1929. The results were as shown in Table 18.

TABLE 18.—Retailers Operating and Price Prevailing for Milk in East Palestine, 1926, 1928, and 1929

	1926	1928	1929
Farms under Board of Health inspection	17	20	20
Farmer-retailers selling in the market	14	14	14
Milk dealers operating in the market	0	1	1
Price paid per gallon to farmers selling market milk—(cents)	25	25	25
Retail price of milk in East Palestine—quarts—(cents)	14	14	14
Pints—(cents)	7	7	7

Warren.—Warren is an industrial city with an estimated population in 1925 of 35,679. Trumbull County was above average in intensity of dairying. There was a large excess of milk production over local demands. This surplus over local needs found its way into both Pittsburg and Cleveland through country plants and direct truck routes.

The milk supply of Warren was studied in cooperation with the Warren Board of Health and the Division of Foods and Dairies of the Ohio State Department of Agriculture in 1926. All plants serving the city with fluid milk were visited and data secured on source of supply and kind of milk sold.

Up to the time of the study the sanitary code of the city had not made pasteurization compulsory. The Board of Health had

taken the stand that if pasteurization were to be a legal requirement it should be made so by state law rather than by city ordinance. The Warren market was therefore open to farmer retailers without pasteurizing plants. In July 1926 the supply was divided approximately as follows: pasteurized 80%, raw from T. B. tested cattle 10%, and raw from untested herds 10%. Due to the progress of the area testing program in the county, the percentage of raw milk from untested herds had fallen by December 1926 to 2.6 per cent and that sold raw from tested herds had increased to 17.2 per cent of the city supply.

In 1926 there were 30 distributors with permits from the Board of Health to sell milk in Warren. Of these sixteen were dealers located within the city and fourteen were producers located at distances ranging from one-fourth mile to seventeen miles from the city. Types of operation and volume of sales are given in Table 19.

TABLE 19.—Number of Distributors, Kind of Milk Sold, and Volume of Sales in Warren, Ohio—July, 1926

Distributor	Kind of milk sold*	Number of producers	Sales per day—gallons
1	Past.	28	700
2	Past.	27	600
3	Past.	25	500
4	Past.	32	600
5	Past.	11	140
6	Past.	11	200
7	Past.	8	135
8	Past.	18	300
9	Past.	6	100
10	R. T. B.	Self	140
11	R. T. B.	Self	95
12	Past.	9	120
13	R. T. B.	3	80
14	R. T. B.	Self	60
15	R. T. B.	Self	60
16	R. T. B.	Self	60
17	R. T. B.	3	50
18	R. N. B.	Self	47
19	R. T. B.	Self	70
20	R. T. B.	Self	65
21	Past.	3	35
22	Past.	Self	37
23-26	R. T. B.	Self	65
27-30	R. N. T.	Self	67
Total 30	.....	201	4326
Average	.....	7	144

*R. T. B. Raw Tuberculin Tested. R. N. T. Raw Not Tested. Past. Pasteurized.

There is a marked contrast between East Palestine and Warren. Pasteurization was optional in both markets but a much larger percentage of the supply was pasteurized in Warren. The

typical producer in the Warren area was a wholesaler selling to a city milk dealer. The twelve pasteurizing plants had 179 producers, while the sixteen non-pasteurizing retailers represented but twenty farms.

Many of the dairymen in Trumbull County are members of the Dairymen's Cooperative Sales Company, a producers' collective bargaining association operating in western Pennsylvania and eastern Ohio. Most of the Warren milk dealers buy through the Dairymen's Cooperative Sales Company.

Since the area surrounding Warren is heavy milk-producing territory and several Pittsburg country plants are located within Trumbull County an arrangement was made between the Dairymen's Cooperative Sales Company and Warren dealers so that in times of shortage in supply the dealers might secure additional milk from the Cortland plant of the Rieck-McJunkin Company. In Table 20 are given the gallons of milk by months supplied to Warren dealers over a period of five years.

TABLE 20.—Gallons of Milk Sold to Warren Dealers From Cortland Creamery, 1925-1929

Month	1925	1926	1927	1928	1929	Total
January	.....	2,600	4,850	.....	.....	7,450
February	.....	1,440	2,770	.....	.....	4,210
March	130	570	960	.....	.....	1,660
April	.....	.....	.....	.....	.....	.....
May	.....	.....	.....	.....	.....	.....
June	.....	.....	.....	.....	.....	.....
July	.....	.....	.....	660	.....	660
August	570	1,400	.....	830	770	3,570
September	2,660	6,925	7,390	.....	.....	16,975
October	4,500	14,390	13,230	150	.....	32,270
November	5,890	11,895	11,120	.....	.....	28,905
December	3,780	9,650	490	.....	.....	13,920
Total	17,530	48,870	40,810	1,640	770	109,620

Canton.—Canton is a typical industrial city. It had an estimated population of 106,260 in 1925 and 116,800 in 1928. Records of sales in the market were secured for the years 1925 to 1929. During this period a strong collective bargaining organization, The Stark County Milk Producers' Association, cooperated with the dealers and Canton Board of Health in adding farms as needed to the milk shed. The city has drawn its milk supply for the most part from the farms of Stark County. This county is the most intensive in dairying of the group adjacent to the Western Reserve.

In February 1929 Massillon was taken into the selling area of the Stark County Milk Producers' Association, and about a year later Alliance was added. The demands of the three markets combined will fall far short of equalling the milk sold from farms in Stark County. This market is an example of what can be done in orderly marketing of milk when a strong producers' organization and progressive dealers work together.

The volume of milk coming into the market in the four years and the farms selling through the association are given in Table 21.

TABLE 21.—Volume of Milk and Members of Cooperative Association, Canton Market, 1926-1929

Year	Estimated population	Total milk receipts—pounds	Average number members selling
1926	111,000	36,584,034	650
1927	113,300	37,333,781	677
1928	116,800	38,133,923	697
1929*	.....	46,246,140	872

*Population estimates not available. Massillon was added to market in February.

Cleveland.—Cleveland with a population, including its suburbs, considerably in excess of a million, represents a marketing situation much more complex and difficult than those described above for the smaller markets. Milk shipping stations or county assembling plants of some character became a necessity early in the development of the Cleveland milk shed. The milk shipping stations made their appearance in northeastern Ohio between 1895 and 1900.

CLEVELAND MILK INSPECTION AND ITS RELATION TO COUNTRY PLANTS

Inspection of dairy farms by the City of Cleveland Division of Health began about 1900. At that time practically all of the city's milk supply came by wagon, steam, or electric roads running into the city from the south and east.

In 1908 the City of Cleveland began the licensing of milk plants. The Sanitary Code passed in 1920 contains a section providing for licenses for all plants selling milk, cream, or butterfat in the city or for plants shipping into the city for the purpose of sale.

The Division of Health recognized that more and more of the milk supply was to come directly to the city by truck. The Amended Sanitary Code passed October 8, 1923 contained section 473 entitled "Covers for Wagons and Trucks."

"Any person using a delivery wagon, truck or other vehicle in the transportation for sale or distribution of milk, cream or skimmed milk shall, from May 1 to September 30, inclusive, have and keep over said delivery wagon, truck or other vehicle a covering of canvas or other material so arranged as adequately to protect the contents thereof from the rays of the sun. From May 1 to September 30, inclusive, no person shall keep any milk, cream or skimmed milk product on such delivery wagon, truck or other vehicle longer than two (2) hours unless ice in sufficient amount or other methods of keeping the temperature of the milk, cream or skimmed milk below fifty-five degrees (55°) Fahrenheit at all times is provided. Milk, cream or skimmed milk which has not been kept at a temperature below fifty-five degrees (55°) Fahrenheit as required by this section shall not be accepted at point of delivery."

There are three specific requirements in this ordinance; covers for the trucks, a limit of two hours in transit, and a maximum temperature of 55°. In some respects the two-hour limit in transit is the most significant. The passage of this ordinance by the city of Cleveland was virtually a statement to milk producers that if they were so situated that milk could be taken from their farms and delivered to the dealer's platform in the city within two hours no country cooling station would be required. This was a very important consideration because those producers whose milk goes through a country cooling station must stand a country plant differential of from fifteen to forty-five cents per hundred pounds of milk.

After five years of operation under this section, Doctor Roy F. Leslie, Chief of Meat and Dairy Inspection, issued a ruling as a guide in the enforcement which has come to be known as "the forty-mile limit rule." It is given in full below. A careful reading of this ruling reveals that the emphasis still remains on the two-hour time limit and that milk within the forty-mile zone, if on the road more than two hours, is barred. The ruling is as follows:

CITY OF CLEVELAND DIVISION OF HEALTH

February 10, 1928

TO ALL MILKMEN, TRUCKMEN AND CREAMERY OPERATORS

"Referring to section 473 of the milk code, or section 612 of the Municipal Code of 1924, this is to advise that there has been set up as a guide in the enforcement of the requirements, that all milk outside of a 40-mile zone from the general offices of the Bureau of Meat & Dairy Inspection in the City of Cleveland be assumed to be unable to be transported to the city in compliance with section 473 unless cooling station facilities be provided, and that all milk outside of the 40-mile zone be required to go through a cooling station and cooled to 55° Fahrenheit or less, excepting that it shows, by investigation, that it may be transported to plants under inspection, at a temperature of 55° Fahrenheit or less, or within a two-hour period; that within said zone all milk be assumed to be able to be shipped to the city in compliance with section 473, unless it be determined by investigation, that milk within this zone was being transported for a longer period than two hours on a truck or vehicle at a temperature higher than 55° Fahrenheit."

It is not certain that this present forty-mile limit will remain indefinitely as a necessary limitation to direct shipping. The Division of Health is watching very closely the development toward insulated truck bodies, improved transportation, and better methods of farm cooling. Developments along these lines in the next five years will have a very marked influence upon the importance of the country cooling station.

The forty-mile limit for direct shipment applied by Cleveland, while neighboring cities, such as Akron, have no such requirements, has resulted in some instances in giving Akron dealers an opportunity to overbid those of Cleveland because the Akron shippers do not have to stand any cooling plant differential. This is a matter that will need careful study in the near future. The two cities are so close that the Cleveland milk shed joins that of Akron in most of its boundaries.

The growth of population in Cleveland and surrounding towns was so rapid during the decade of 1920 to 1929 that the territory under inspection could not supply all the consumption demand. New sources were brought under inspection as rapidly as they could meet the requirements. In the first few years of fall milk shortage, permits to ship into the city were given to a considerable number of plants outside the State. Cleveland distributors, however, realizing that permanent additions must be made to the milk supply, began to develop new areas within Ohio, and there came under inspection a new group of Ohio plants located farther away from Cleveland than those that originally constituted the supply.

These plants fall naturally into three groups: (a) country cooling stations, (b) manufacturing plants, (c) milk distributing plants in other towns. The country receiving and shipping station, whose function is to cool the milk as it comes in from the farms to the required temperature and send it into the market, is still to be found beyond the forty-mile limit.

The second group includes the manufacturing plant that has its producers under Cleveland Inspection and can, at such times as required, divert quantities of whole milk into the city market. The plants at Wellington, Lodi, and Orrville are good examples of this type.

A third type has come into prominence within the past five years. It is the distributing plant of the smaller city within shipping distance of Cleveland. By securing permission to send milk to Cleveland all farms selling to the concern are brought under

inspection of the Cleveland Division of Health. This, in almost every instance, is a more rigid inspection than is exercised by the local health authorities. This procedure, therefore, while adding a part of the plant's receipts to the potential milk supply of Cleveland, also provides a greater degree of supervision to the milk supply of the smaller city.

These shifting conditions have created for the City of Cleveland a real problem with respect to the cost of inspection. In the early years when the city was forced to put many plants outside the state borders under inspection there was no provision for making any charge for inspection service. In 1926 the following amendment was added to the Sanitary Code as Section 587-2.

> "Whenever the enforcement of the provisions of the sections of this chapter relating to milk and dairy inspection required inspectional visits to points beyond 150 miles from the general offices of the bureau of meat and dairy inspection in the city of Cleveland the reasonable cost of such inspectional visits, including time consumed and expense incurred in traveling by bureau employees shall be paid by whose premises are so inspected. When more than one establishment handling milk or milk products is included in any inspection trip made by bureau employees the proper proportion of the traveling expenses of said employees shall be paid by each person, firm or corporation whose premises are so inspected."

Figure 9 shows the location of plants under inspection by the Cleveland Division of Health at some time during 1929. Those in outlying positions are operating under permits to ship cream and other products such as cottage cheese.

The increasing demand upon the part of dealers in towns within the Cleveland milk shed for inspection may result in the necessity of an additional ordinance providing for some distribution of costs between Cleveland and the other market; otherwise, the city of Cleveland will find itself in the position of providing farm inspection for the milk supply of all towns of northern and northeastern Ohio. In a limited way some interchange of inspection has recently taken place between Cleveland and a few of the larger towns. The inspection of Akron, Canton, and Sandusky has been recognized to a certain extent. A general exchange arrangement would not now, however, be feasible. With the growing tendency for small town distributing concerns to function as Cleveland shipping plants this becomes one of the most pressing problems of the Division of Health.

APPROVED DAIRIES

In 1923 the Division of Health began issuing Approved Dairy Certificates to farms that reached certain advanced dairy standards. These standards applied to health and care of cattle and sanitary conditions of the premises.

The product of approved dairies may be sold as Class 1 milk by dealers at a premium price provided only Class 1 milk is handled in a single distributing plant. Provision must also be made in the country plants to handle the milk from the approved dairies separate from other milk.

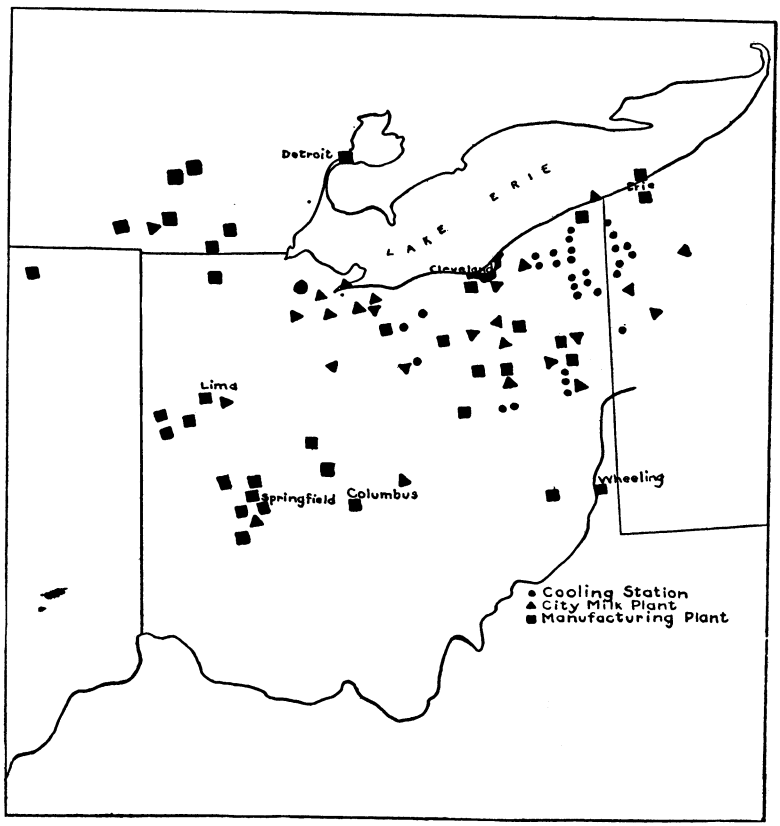

Fig. 9.—Plants with permits to ship milk or dairy products into Cleveland in 1929

Two counties in Pennsylvania have a few farms on the approved list; Crawford with 23 and Mercer with 5. Licking County, Ohio, has 2. On October 18, 1929 there were in all 1235 approved dairies in the entire shed. All except the thirty noted above were within the thirty-three counties of the study. Their distribution by counties is given in Table 22.

TABLE 22.—Distribution of Approved Dairies, Cleveland Division of Health, October 18, 1929

County	No. approved dairies	Per cent of total
Lorain	251	20.3
Geauga	202	16.4
Ashtabula	162	13.1
Medina	125	10.1
Portage	100	8.1
Trumbull	90	7.3
Huron	76	6.2
Summit	45	3.6
Ashland	39	3.2
Lake	31	2.5
Cuyahoga	22	1.8
Mahoning	19	1.5
Columbiana	15	1.2
Wayne	13	1.1
Erie	11	.9
Crawford	4	.3
Outside area	30	2.4
Total	1235	100.0

These special provisions for the handling of Class 1 milk make the geographical distribution and the density of approved dairies a matter of great importance to dealers. This distribution is shown in Figure 10. The ability of farmers in a county to meet the approved dairy standards determines to a large measure the attractiveness of the county to a distributor who is selling Class 1 milk.

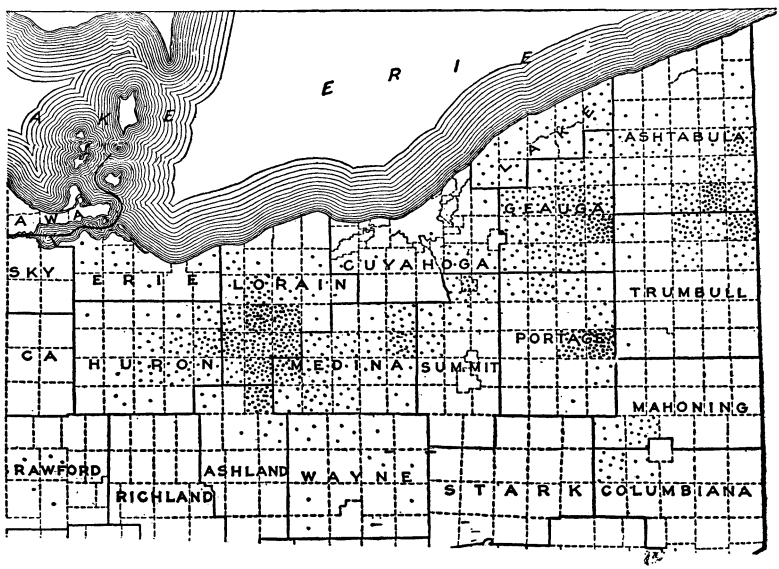

Fig. 10.—Location of Approved Dairies, Cleveland Division of Health, as of Oct. 18, 1929

EFFECT OF AREA TESTING FOR TUBERCULOSIS UPON MILK SUPPLY

Cleveland City Council passed an ordinance in July 1926 to control the milk supply as related to testing for tuberculosis. Claims were made by those opposed to compulsory testing that enforcement of this ordinance would be disastrous to the city milk supply. Later these critics also placed the blame for shortages of milk in 1927 and 1928 upon the testing program. In the following analysis an attempt has been made to test the validity of these claims.

In order to estimate the effect of the testing program upon milk supply an assumption must be made with respect to replacement of reactors. A study made of Green Township in Trumbull County showed that replacements were practically complete by the end of a year. When infection was light replacement was more rapid. When it was heavy the dairyman was more inclined to await the retest before making replacements.

In Tables 23, 24, and 25 the progress of testing is shown in the thirty-three counties. As would be expected the testing program was largely centered in the nearby counties of the Western Reserve in these three years. Bovine tuberculosis was more prevalent in these counties than in most of the outlying group.

TABLE 23.—Progress of Tuberculosis Area Testing and Effect Upon Number of Dairy Cows in Northeastern Ohio, 1927

Period	Milk cows on farms Jan. 1, 1927*	Cattle tested	Reactors	Reactors as per cent of cattle tested	Reactors as per cent of milk cows Jan. 1, 1927
	No.	*No.*	*No.*		
Western Reserve	155,000				
January-March		35,632	4,174	11.71	2.69
April-June		27,458	1,389	5.06	.90
July-September		23,752	1,845	7.77	1.19
October-December		20,339	893	4.39	.58
Year		107,181	8,301	7.75	5.36
21 adjoining counties	240,000				
January-March		16,096	463	2.88	.19
April-June		33,013	371	1.12	.15
July-September		26,348	948	3.60	.39
October-December		24,105	682	2.83	.28
Year		99,562	2,464	2.47	1.01
33 counties	395,000				
January-March		51,728	4,637	8.96	1.18
April-June		60,471	1,760	2.91	.44
July-September		50,100	2,793	5.57	.70
October-December		44,444	1,575	3.34	.40
Year		206,743	10,765	5.21	2.72

*Federal and State Crop and Livestock Reports.

TABLE 24.—Progress of Tuberculosis Area Testing and Effect Upon Number of Dairy Cows in Northeastern Ohio, 1928

Period	Milk cows on farms Jan. 1, 1928*	Cattle tested	Reactors	Reactors as per cent of cattle tested	Reactors as per cent of milk cows Jan. 1, 1928
	No.	*No.*	*No.*		
Western Reserve	148,000				
January–March		24,468	1,463	5.96	.99
April–June		28,123	999	3.53	.67
July–September		25,335	985	3.89	.66
October–December		17,682	1,299	7.35	.88
Year		95,608	4,746	4.96	3.21
21 adjacent counties	240,000				
January–March		18,565	306	1.65	.13
April–June		22,904	163	.71	.07
July–September		28,901	523	1.81	.22
October–December		29,354	696	2.37	.28
Year		99,724	1,688	1.69	.70
33 counties	388,000				
January–March		43,033	1,769	4.11	.45
April–June		51,027	1,162	2.28	.30
July–September		54,236	1,508	2.78	.39
October–December		47,036	1,998	4.24	.51
Year		195,332	6,434	3.29	1.66

*Federal and State Crop and Livestock Reports.

TABLE 25.—Progress of Tuberculosis Area Testing and Effect Upon Number of Dairy Cows in Northeastern Ohio, 1929

Period	Milk cows on farms Jan. 1, 1929*	Cattle tested	Reactors	Reactors as per cent of cattle tested	Reactors as per cent of milk cows Jan. 1, 1929
	No.	*No.*	*No.*		
Western Reserve	147,000				
January–March		38,598	1,059	2.74	.72
April–June		42,226	2,218	5.25	1.51
July–September		28,539	2,843	9.96	1.93
October–December		18,352	827	4.51	.56
Year		127,715	6,947	5.44	4.71
21 adjacent counties	240,000				
January–March		26,520	713	2.69	.30
April–June		40,238	581	1.44	.24
July–September		45,356	322	.71	.13
October–December		56,369	315	.56	.13
Year		168,483	1,931	1.15	.80
33 counties	387,000				
January–March		65,116	1,772	2.72	.45
April–June		82,464	2,799	3.39	.72
July–September		73,895	3,165	4.28	.82
October–December		74,721	1,142	1.53	.30
Year		296,198	8,878	3.00	2.29

*Federal and State Crop and Livestock Reports.

The conclusion drawn from the analysis is that the removal of cattle as a result of area testing was not an influence of great consequence in the total milk supply. At no time did it influence the supply as much as 3 per cent. Some areas were kept from joining the Cleveland milk shed because of failure to push the testing program but this was balanced by more activity of dealers in adding tested territory.

RATING OF COUNTIES AS TO MARKET-MILK POSSIBILITIES

In the foregoing data a picture of the intensity of the dairy industry was given by groups of counties. An attempt will now be made to apply three measures of attractiveness to milk dealers to each individual county of the thirty-three and, on the basis of these measures, to rate it in possibilities as market-milk territory.

These measures are: (a) the value of dairy products produced per square mile, (b) the number of dairy cows two years old and over per 100 acres of crop and pasture land, and (c) the percentage of farms located on hard surface roads so that milk may be hauled from them every day in the year. Data were secured from the 1925 Census of Agriculture.

The first two are closely correlated but are not the same. The concentration of product per square mile determines in a large degree the cost of picking up a truck load of milk. To the dealer it is an important consideration particularly in the opening of new territory. The concentration of cows upon the improved land is also an indication of intensity, but if the county contains much waste land a fairly high number of cows per 100 acres of improved land may not indicate a large volume of milk per square mile.

The significance of location of farms with respect to all-year-round roads is evident. This is of special importance in areas where the milk is trucked directly from the farm to the market. This factor is undergoing more rapid change than the others, due to extensive road building programs in many counties.

The procedure followed in rating the thirty-three counties on a combination of these three factors was to compare each county on a single factor with the average of the entire group. These relative percentages were then added to make a county total, and the counties were ranked in the order of these totals. The results are shown in Table 26.

TABLE 26.—Value of Dairy Products per Square Mile, Cows per 100 Acres of Crop and Pasture Land, and Per Cent of Farms on Hard-Surfaced Roads
Compiled from 1925 Census of Agriculture

County	Value dairy products per sq. mi.	Per cent of average	Dairy cows per 100 A. C. & P. land	Per cent of average	Farms on hard-surfaced roads	Per cent of average	Total per-centages	Rank
	Dollars		*No.*		*Per cent*			
Ashtabula	3527	179	7.8	153	38.3	92	424	4
Cuyahoga	1155	59	5.7	112	76.4	184	355	13
Erie	1689	86	5.2	102	80.0	192	380	9
Geauga	4343	221	7.7	151	41.3	99	471	2
Huron	1271	65	3.7	73	57.0	137	275	20
Lake	1874	95	5.5	108	64.3	155	358	12
Lorain	4228	215	7.6	149	50.3	121	485	1
Mahoning	3028	154	7.6	149	60.5	146	449	3
Medina	3274	166	6.2	122	40.6	98	386	8
Portage	3188	162	7.4	145	35.7	86	393	7
Summit	2787	142	7.2	141	36.7	88	371	10
Trumbull	2829	144	7.1	139	52.6	127	410	6
Ashland	1367	69	4.3	84	27.6	66	219	25
Belmont	1686	86	5.9	116	17.0	41	243	22
Carroll	960	49	3.4	67	7.3	18	134	31
Columbiana	2343	119	6.2	122	22.0	53	294	17
Coshocton	924	47	2.2	43	30.2	73	163	29
Crawford	1273	65	3.4	67	71.3	172	304	16
Guernsey	1111	56	1.8	35	9.6	23	114	32
Hancock	1263	64	3.9	76	82.8	199	339	15
Harrison	718	37	2.5	49	11.1	27	113	33
Holmes	1927	98	5.4	106	15.5	37	241	23
Jefferson	1061	54	4.5	88	29.2	70	212	27
Knox	1284	65	3.9	76	28.5	69	210	28
Muskingum	1091	55	2.6	51	20.2	49	155	30
Ottawa	1145	58	5.0	98	26.3	63	219	26
Richland	1539	78	4.3	84	34.3	83	245	21
Sandusky	1430	73	4.6	90	82.6	199	362	11
Seneca	1151	59	2.8	55	72.2	174	288	19
Stark	3582	182	7.5	147	33.9	82	411	5
Tuscarawas	1549	79	4.6	90	22.3	54	223	24
Wayne	3282	167	6.8	133	19.5	47	347	14
Wyandot	1062	54	3.0	59	74.4	179	292	18
Average 33 counties	1967	.....	5.1	.....	41.6	.....	.....	.....

The counties fall into three groups as follows: (See also Figure 11).

HIGH		MEDIUM		LOW	
1.	Lorain	12.	Lake	23.	Holmes
2.	Geauga	13.	Cuyahoga	24.	Tuscarawas
3.	Mahoning	14.	Wayne	25.	Ashland
4.	Ashtabula	15.	Hancock	26.	Ottawa
5.	Stark	16.	Crawford	27.	Jefferson
6.	Trumbull	17.	Columbiana	28.	Knox
7.	Portage	18.	Wyandot	29.	Coshocton
8.	Medina	19.	Seneca	30.	Muskingum
9.	Erie	20.	Huron	31.	Carroll
10.	Summit	21.	Richland	32.	Guernsey
11.	Sandusky	22.	Belmont	33.	Harrison

It is evident that the Western Reserve had in 1925 a commanding position on the basis of these valuations. It is also significant that the medium group contains eight counties lying south and west of Cleveland and only two, Columbiana and Belmont, south and east. The fact that Cleveland dealers have shown unusual

activity in opening new territory in the area lying southwest of the city would seem to indicate that these factors have some value in predicting the trends in milk-shed expansion.

LOCAL COMPETITION FOR MILK

The proximity of markets, the ready access to many farms by truck, and the variety of agencies buying milk result in very keen local competition in certain parts of this area. Green Township in Wayne County was selected as typical of a large area that has been undergoing development as market-milk territory.

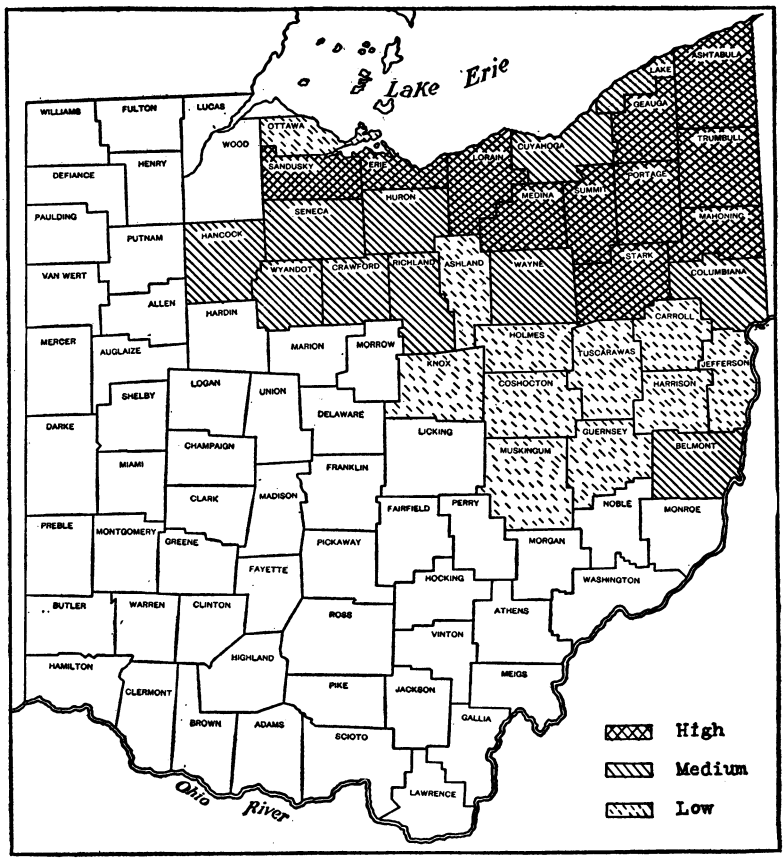

Fig. 11.—Rating of Northeastern Ohio counties in market milk possibilities

Orrville, a town of about 4000 population, is on the eastern edge of the township. It depends largely upon Green township

farms for its milk supply. The Orrville milk condensery affords a whole-milk market close at hand. The township is within easy reach by truck of both Akron and Cleveland.

Smith Dairy of Orrville started 21 years ago to receive milk from Green Township farms. In 1930 there were 32 farms representing approximately 425 cows supplying milk to this dairy. Practically all these farmers transport their milk individually to the dairy in Orrville.

When the fluid milk requirements of Akron reached the point where prospects of shortage developed, an arrangement was made with the Orrville condensery by which it became a reserve for the Akron milk pool. Because of the easy access to Akron from Green Township, practically all of these farms were transferred to direct truck routes of two Akron dealers. Farmers sending milk directly to Akron received a premium of fifteen cents per hundred pounds over those whose milk went to the Orrville condensery.

About 1924 Cleveland dealers invaded the territory. The first block of producers was secured north of Smithville. They represented about 1000 pounds of milk per day. The price paid by the Cleveland concern was also 15 cents over the Orrville price. The buyer agreed to take all milk produced the year around with no reduction for surplus.

Data were secured on the township in 1929 and 1930 to determine the distribution of farms among the various market outlets. The records prepared by the State Veterinarian for the area testing contained 254 farms reporting three or more cows per farm. There were five market agencies that received the milk from six or more dairy farms each; Akron Pure Milk Company and Averill Dairy, Akron; Smith Dairy, Orrville; Maple Heights Dairy, Cleveland, and the Orrville Milk Condensing Company. The following were each outlets for the milk of two dairies: Wooster Farm Dairies, Fred Walker Dairy (Cleveland), and Mara Alva Dairy Farms (Green Township). There is almost a complete interlacing of the three markets, Akron, Cleveland, and Orrville, within the township. The play of free competition has apparently given no market a distinct advantage over the others.

MILK PLANTS AS MARKET RESERVES

The program of country plant building which reached its highest point of development about 1920 resulted in Cleveland and Pittsburg dealers gaining control of more milk than was needed to meet the actual minimum of fresh milk requirements. In a sense, therefore, these plants were reserve supply depots for these cities.

The Pittsburg plants of the Rieck-McJunkin Company have also functioned as very effective reserves for many of the smaller markets in northeastern Ohio. The amounts of milk sold to dealers in Ohio towns in the five-year period, 1925-1929, from the plants of this company are given in Table 27. In the five-year period over eight hundred thousand gallons were sold to these smaller markets. The high year was 1928.

TABLE 27.—Milk Sold to Dealers in Towns of Northeastern Ohio From Rieck-McJunkin Country Plants, 1925-1929

Name of plant	1925	1926	1927	1928	1929	Total
	Gal.	*Gal.*	*Gal.*	*Gal.*	*Gal.*	*Gal.*
Cortland	75,120	202,615	84,525	138,863	31,348	532,471
Austinburg	10,340	10,220	17,690	21,310	36,050	95,610
Nutwood	.....	8,385	21,295	80,419	350	110,449
Dorset	.....	11,820	.....	.....	.....	11,820
Windsor	.....	17,460	2,730	5,110	.....	25,300
Stanhope	.....	.....	.....	32,863	110	32,973
Rock Creek	.....	.....	.....	10,383	.....	10,383
Total	85,460	250,500	126,240	288,948	67,858	819,006

The October, November, and December sales to local markets are of greatest significance. The milk purchased in other months was incidental. The sales of October, November, and December are given in Table 28.

TABLE 28.—Milk Sold by Months in Short Production Period From Rieck-McJunkin Plants to Local Markets, 1925-1929

Month	1925	1926	1927	1928	1929	1925-1929
	Gal.	*Gal.*	*Gal.*	*Gal.*	*Gal.*	*Gal.*
October	12,250	59,575	33,910	80,769	5,600	192,102
November	22,490	68,785	29,390	57,688	3,170	181,523
December	25,670	39,670	7,810	29,958	.....	103,108
Monthly average	20,137	56,010	23,703	56,138	2,923	.....
Daily average	657	1,826	773	1,831	95	.....

The heavy demands upon reserve supplies were in 1926 and 1928, when sales averaged 15,704 and 15,747 pounds daily for the three-month period. On the basis of an average of 115 pounds per day per dairy this represented the product of 137 farms.

One of the most effective of the reserve arrangements is that of the Summit County Milk Producers' Association and the Orrville Milk Condensing Company. The 1929 contract provided that members of the Association sending milk to the Orrville condensery were to receive fifteen cents per hundredweight less than

the pool price. The Orrville Milk Condensing Company agreed to carry not more than ten per cent of the total number of pounds of milk in the Akron pool.

The Orrville Milk Condensing Company paid thirty cents above Class 2 price, delivered at Orrville, for association members' milk. It agreed to sell to the Akron dealers part or all of its pool milk at one dollar per hundredweight above Class 2 price, f. o. b. Orrville. This milk was to be distributed among the dealers in proportion to the amount of fluid milk sold by them.

Dealers were entitled to draw milk from the Orrville Milk Condensing Company up to their total supply in the pool, and each dealer was entitled to his proportionate amount. In no case was a dealer permitted to figure such milk in his receipts when his percentage of Class 2 milk was in excess of 28 per cent.

Dealers had the privilege of disposing of excess surplus milk to the Orrville Milk Condensing Company at Class 2 price, f. o. b. Orrville. The Akron Pure Milk Company was limited to a maximum of 30,000 pounds on any single day without special consent of the Orrville Milk Condensing Company.

This arrangement has worked successfully for several years. In the fall of 1928 substantial amounts were taken from the condensery pool by the Akron dealers. In the fall of 1929 it was not found necessary to draw upon the pool. In the winter and spring of 1930 surplus began to pile up earlier than usual and dealers exercised their privilege of sending the excess to the condensery.

CHANGES IN MILK-SHED BOUNDARIES

The shift from rail to truck transportation of milk and the extension of hard-surfaced roads brought some marked changes in market destinations of milk in certain counties of northeastern Ohio.

One of the first shifts based on change of transportation method took place in Trumbull and Ashtabula counties. In 1925 the Grand River Trucking Company began soliciting milk for truck transportation to Cleveland. Within less than two years the business had grown to fourteen routes, involving 800 to 1000 cans of milk daily. Most of the farmers that shifted to these routes came from the Pittsburg country plants. This resulted in an interlacing of Cleveland truck routes in Pittsburg country plant territory.

There was also some transfer of cooling plants from Pittsburg to Cleveland dealers. A few isolated plants operated by Pittsburg dealers were sold to Cleveland firms in 1925 to 1928. The most

extensive of these transfers occurred in November 1929 when the Rieck-McJunkin Dairy Company of Pittsburg sold to the Telling-Belle-Vernon Company of Cleveland six country plants in Trumbull and Ashtabula counties. This involved the transfer of about 750 producers. The volume of milk ranged from 75,000 to 150,000 pounds per day, depending upon the season.

Cleveland dealers in the past five years have also added much new territory south and west of the city. The Ohio Farmers' Cooperative Milk Association acquired plants in Fostoria, Ashland, and Bucyrus, which are operated both for retail distribution and as receiving stations for Cleveland milk. Other firms established contacts with condenseries in northwestern Ohio.

The entry of Cleveland buyers into the Swiss cheese area has been mentioned. In addition to the operation already described the Wooster Farm Dairies have added some cheese factories to their territory. This milk is trucked to Cleveland.

The very rapid growth of population in Akron made it necessary to expand the milk shed of that city to include the patrons of the Orrville condensery. The territory added was principally in Wayne, Holmes, and Tuscarawas counties.

TABLE 29.—Sources of Milk Supply by Counties for Cleveland, Pittsburg, Akron, and Canton Markets, 1929

County	Cleveland	Pittsburg	Akron	Canton
Ashland	x			
Ashtabula	x			
Belmont		x		
Columbiana	x	x		
Crawford	x			
Cuyahoga	x			
Erie	x			
Geauga	x	x		
Guernsey		x		
Hancock	x			
Holmes	x		x	
Huron	x			
Knox	x			
Jefferson		x		
Lake	x			
Lorain	x			
Mahoning	x	x		
Medina	x	x	x	
Ottawa	x			
Portage	x		x	
Richland	x			
Sandusky	x			
Seneca	x			
Summit	x	x	x	
Stark				x
Trumbull	x	x		
Tuscarawas	x		x	x
Wayne	x		x	

It is not possible to draw fixed boundary lines that define accurately the milk sheds of the various markets of northeastern

Ohio. Table 29 is an attempt to show roughly the sources of supply of the four important markets, Cleveland, Pittsburg, Akron, and Canton.

In Figure 12 the lines show only the approximate boundaries of the milk sheds. No attempt has been made to include those of the smaller markets. It can be assumed that local requirements in the smaller markets are cared for first, and that the larger market will receive milk produced in excess of local needs.

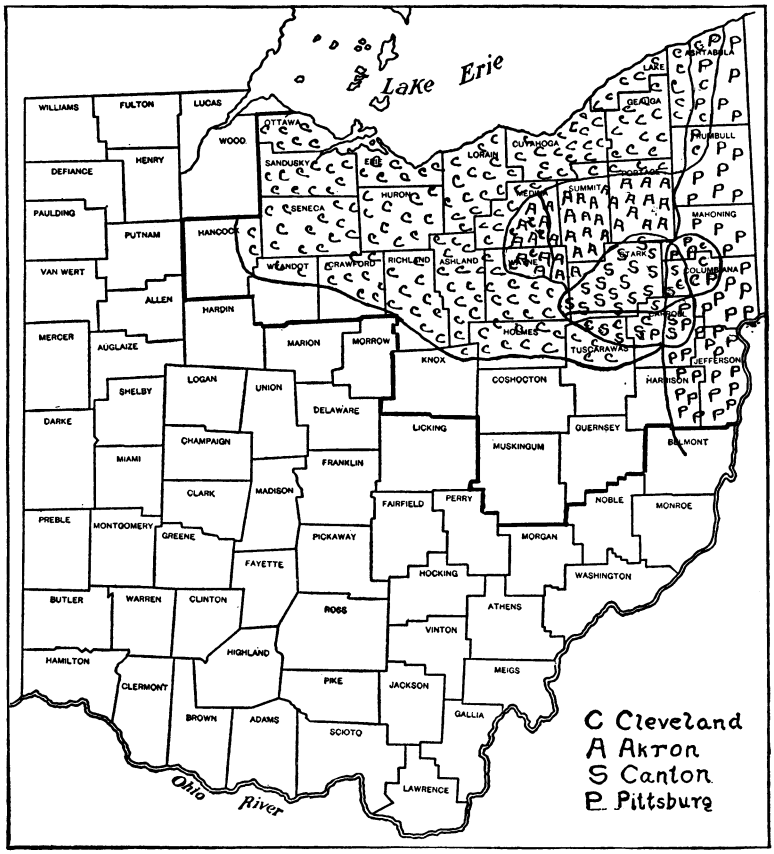

Fig. 12.—Milk shed boundaries

SUMMARY

The purpose of the study was to trace the economic influences that shaped the development of market milk in northeastern Ohio.

United States Census figures show that in 1899 the Western Reserve produced 20.56 per cent of the total milk production of Ohio with 20.41 per cent of the cows; in 1924 it produced 21.76 per cent of the milk with 19.12 per cent of the cows. This improvement in position was not equalled in the 21 adjacent counties. In percentage relation to the State as a group, they made no change. Eight of the twelve Western Reserve counties, Ashtabula, Geauga, Erie, Huron, Lorain, Mahoning, Medina, and Portage, advanced in percentage relation to the State as a whole in this period.

There is a marked difference in annual production per cow on crop reporters' farms in the three crop reporting districts of the area for the years 1926 to 1929. District No. 3 comprising mainly the Western Reserve counties averaged 6,385 pounds. District No. 2, a block south and west of Cleveland, 6,043 pounds, and District No. 6, south of the Western Reserve, 5,572 pounds. The state average was 5,812 pounds.

The ratio of dairy cows to population was undergoing a rapid change from 1870 to 1920. In the 33 counties in 1870 there were 144 dairy cows to one hundred people living in towns of 2500 and over. In 1920 this ratio had fallen to 19 cows to one hundred urban people.

Previous to 1900 most of the milk of the area was going into manufacture of cheese and butter. In the past twenty-five years the milk-marketing problem of northeastern Ohio has been to adjust a relatively constant milk supply to the needs of a very rapidly growing urban population. It has been solved in part by change from manufacturing to market-milk outlets, in part by addition of more distant areas to the milk sheds of Cleveland and Pittsburg, and in part by greater production per cow.

Average daily milk sales per farm in 1927 were: Pittsburg country plants 146.8 pounds, Cleveland plants 157.3 pounds, Akron market 147 pounds, and Canton market 151 pounds. In seasonal variation the Pittsburg plants had the widest range with 207.2 pounds average in May and 103.6 pounds in October 1927.

Farm sales averaged lowest over a period of three years in all markets in November. The range of average daily sales per farm for November was 95 pounds to 135 pounds. The midpoint of these

figures, 115 pounds per farm per day, is considered the most reliable norm of fall farm sales for this area. This is .22 per cent of the average annual production.

In territory going from Swiss cheese manufacture to market milk it was found that farm sales increased to market-milk outlets. Five cheese factories were purchased in Tuscarawas County by a Cleveland milk company. The total pounds of milk received in the first ten months of market-milk operation were more than double the receipts of the same months two years previous under Swiss cheese operation.

Daily per capita consumption of fresh milk and cream in whole milk equivalent for Akron and Canton was found to be approximately .75 of a pound. Milk dealers and board of health officials generally agree that for a safe margin the potential milk supply of a city should be equivalent to one pound per day per capita in the shortest period of production.

Four typical markets of different sizes were studied as to source of supply and methods of selling. In the smallest market, East Palestine, the farmer-retailer dominated the market with average daily volume of twenty-two gallons. In Warren and Canton, dealers with pasteurizing plants receiving milk directly from the farms had practically all of the sales. In the Cleveland market country plants, testing for tuberculosis and approved dairies have given rise to many marketing problems.

The results of the area testing program for the three years 1927 to 1929, inclusive, were tabulated and the losses expressed in terms of percentage of the total dairy cows of the area. The conclusion drawn from the analysis was that the removal of cattle as a result of area testing was not an influence of great consequence. At no time did it affect the total number of cattle producing milk in the entire area of the thirty-three counties as much as 3 per cent.

The thirty-three counties were rated as to market-milk possibilities. The measures used in this rating were (a) value of dairy products per square mile in 1924, (b) number of dairy cows per 100 acres of crop and pasture land, and (c) percentage of farms located on hard-surfaced roads. On this rating the counties were divided into three groups of eleven each. Roughly the Western Reserve counties were high, the counties south and west of Cleveland medium, and the southeastern counties low in possibilities.

Local competition for milk in areas with fair possibilities as market-milk territory is very keen. Green Township in Wayne County was studied as typical of such territory. Market milk is now going from this township to Cleveland, Akron, and Orrville. Eight agencies from these markets are involved in its purchase.

Some of the larger manufacturing plants in the 33 counties studied have served as market-milk reserves. Pittsburg plants sold a total of 819,000 gallons to small dealers within this territory in 1925 to 1929. The sales in the fall of 1929 declined sharply indicating that these plants will take care of the larger market needs first and sell only surplus to local dealers.

The most important changes in milk-shed lines have been between Pittsburg and Cleveland in Ashtabula and Trumbull counties and the enlargement of the Akron milk shed by the addition of the Orrville condensery territory. The Cleveland dealers have also added much new territory south and west of the city.

This page intentionally blank.

This page intentionally blank.

This page intentionally blank.